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(19)

(54) IMPROVEMENTS IN OR RELATING TO MARKING ELEMENTS

(71) We, P. P. PAYNE LIMITED, a British Company, of P.O. Box 26, Haydn Road, Nottingham, NG5 1DL do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to marking elements and is concerned with marking elements suitable for marking textile articles such as wearing apparel.

Marking elements comprising marking characters are conventionally used to mark such articles for the purpose of providing on the articles information or decorative effects. For example, the marking characters of the element may be in the form of a trade mark relating to the article or in the form of instructions for the washing or dry-cleaning of the article. Such marking characters are intended to remain on the article for the life of the article.

Marking elements in the form of labels or transfers are known. However, conventional marking elements are frequently relatively inflexible and tend to cause stiffening of the article in the marked area. Also, the constituents of conventional marking elements have a tendency to gel. In addition, conventional marking elements do not generally have a satisfactory level of adhesion to the article, particularly when the article is formed of cellulose acetate or polyester fabric. Further, heat and pressure have often to be applied for a relatively long time when marking articles using conventional marking elements.

According to the present invention, there is provided a marking element suitable for marking a textile article, which element comprises a support and marking characters and has at least one face which includes curable polyurethane composition comprising (a) a liquid urethane prepolymer of which the free isocyanate groups are substantially blocked and (b) an elastomeric polyamine-extended polyurethane.

In use of the marking elements, the element is superposed on the article to be marked so that the face of the element including the heat curable polyurethane composition is adjacent the article and heat and pressure is applied to cause said face to be bonded to the article by the fusion of the polyurethane composition at a temperature which pomotes curing of the composition. The heat and pressure applied causes the isocyanate groups of the urethane prepolymer to become unblocked and available for reaction during the curing.

In accordance with a particularly preferred embodiment, the heat curable polyurethane composition is of the type described in British Patent Specification No. 1,286,422 in which case the liquid urethane prepolymer is formed by reacting an oxime with an isocyanate-terminated polyurethane derived from a hydrocarbon diisocyanate and an aliphatic polyol and the elastomeric polyamine-extended polyurethane is obtained by reacting a polyamine with an isocyanate-terminated polyurethane derived from a hydrocarbon diisocyanate and an aliphatic polyol.

It has been found that marking elements which include a heat curable polyurethane composition in accordance with the present invention result in markings which are particularly resistant to laundering up to the boiling temperature of water and to dry-cleaning using, for example, white spirit, perchlorethylene and trichlorethylene. Articles provided with markings by means of the marking elements of the invention generally have improved flexibility. Further, markings produced using the marking elements of the invention have good adhesion

particularly to articles based on polyesters and acetate fibres.

The marking elements of the present invention may be in the form of labels or transfers.

In the former case, the support of the element is a permanent part of the element and may be formed of for example woven fabric or bonded fibres. The support may be impregnated or coated with the heat curable polyurethane composition so that at least one face of the support includes the polyurethane composition. The other face or one of the faces as the case may be carries the marking characters which may be printed thereon using a suitable ink. The vehicle of the ink may include a heat curable polyurethane composition but other inks may be used if desired. Optionally, the marking characters may be over-coated with a further layer which may be formed of heat curable polyurethane composition. This overcoating may be a continuous coating extending substantially entirely over the surface of the element or, alternatively, it may be applied such that it is substantially merely in registry with the marking characters. Over-coating layers of materials other than heat curable polyurethane compositions may be used provided that the resultant layer is sufficiently clear to allow the marking characters to be visible through the layer and is adequately resistant to washing and dry cleaning processes.

In use of the label, it is applied against the article to be marked so that that face of the support which includes the polyurethane is adjacent the article. Thereafter, heat and pressure is applied to cause the polyurethane to bond the label to the article and cause curing of the polyurethane composition.

In the case where the marking element is in the form of a transfer, the support is a temporary support and does not constitute a part of the element once applied to the article. In this case, the support may be formed of board, paper, bonded fibre or film suitably treated so that it has adequate release properties. The marking characters may be produced by printing directly onto one surface of the support. Alternatively, the support may be provided with a clear layer on one face and the marking characters may then be printed onto the free face of this clear layer. The clear layer may be a continuous layer extending completely over one surface of the support. Alternatively, the clear layer may be discontinuous so that it and the marking characters are substantially in registry. The clear layer may be formed of a heat curable polyurethane composition but other materials can be used provided that they are sufficiently clear and durable. The ink used to apply the marking characters may include, as vehicle liquid, a heat curable polyurethane composition. This is essential if no further layer is applied to the marking characters. If, however, a further layer of heat curable polyurethane composition is applied to the marking characters, it is not essential for the ink used to produce the marking characters to be formed of a heat curable polyurethane composition. In any event, however, that face of the element which is most remote from the temporary support must include a heat curable polyurethane composition.

In use, the transfer is located on the article to be labelled with the temporary support uppermost. Thereafter, heat and pressure is applied to cause the polyurethane composition to bond the element to the article and cure. Then the temporary support is removed.

The following Examples illustrate the invention.

EXAMPLE 1

A length of woven fabric having a weft consisting of 70 ypi of 150 denier nylon 66 yarn and a warp of 94 ypi of 100 denier nylon 66 yarn was provided. Marking characters were provided on one face of the fabric by a printing technique using an ink comprising, as vehicle liquid, a non-gelling heat curable polyurethane composition. The composition consisted of 100 parts by weight of Beckurane 2086 (Part I) and 3 parts by weight of Beckurane 2086 (part II). (The word "Beckurane" is a Trade Mark). This polyurethane composition is of the type described in British Patent Specification No. 1,286,422 dissolved in methyl ethyl ketone to form a solution of about 45% solids content. Beckurane 2086 (Part I) is a polyamine extended polyurethane and Beckurane 2086 (Part II) is a blocked urethane prepolymer. The non-printed side of the woven fabric was coated with a solution comprising:—

Beckurane
2087 (Part I) : 100 parts by weight
Beckurane
2086 (Part II) : 3 parts by weight
Tioxide
RCR 3 : 0.5 parts by weight

Tioxide RCR 3 is a proprietary titanium dioxide pigment and the word "Tioxide" is a Trade Mark.

The fabric was coated such that the coating had a dry weight of some 85 to 95 gms per square metre. After application of the solution, the solvent was removed to form the desired coating. During solvent removal, it was ensured that the

air temperature did not exceed 80°C.

The length of coated fabric was subsequently cut into individual labels each consisting of a piece of the fabric having a coating of heat curable polyurethane on one face and marking characters on the other. Several of the labels were located on a cotton fabric so that the polyurethane coating was adjacent the cotton fabric. The labels were applied to the fabric using a pneumatically operated press set at the following conditions:—

Top platen Temperature	: 200°C.
Bottom Platen Temperature	: 200°C.
Pressure	: 45 psi
Dwell Time	: 5 seconds.

It was found that the labels had been well sealed to the cotton fabric. The fabric carrying the labels was subjected to domestic laundering and the labels remained firmly adjacent to the cotton fabric after twenty 8 minute cycles at boiling. The labels were also unaffected by commercial dry-cleaning and also after soaking in trichlorethylene.

EXAMPLE 2

A board commercially produced for use in casting films of polyvinyl chloride and having a surface having release properties was provided with a continuous coating by applying the following solution thereto using a silk screen printing technique and employing a screen of size 200 mesh per inch:—

Vinylite VYHH	: 146 parts by weight
Paraplex G62	: 22 parts by weight
Stabiliser VZ 147	: 4 parts by weight
Shellsol E	: 360 parts by weight
Sextone B	: 80 parts by weight

Vinylite VYHH is a vinyl chloride/vinyl acetate copolymer supplied by Bakelite Xylonite Limited; Paraplex G62 is a polyester plasticiser supplied by Lennig Chemicals Limited; Stabiliser VZ 147 is an epoxised oil supplied by Bakelite Xylonite Limited; Shellsol E is a hydrocarbon solvent marketed by Shell Chemicals Limited; and Sextone B is methyl cyclohexanone marketed by Laporte Limited. (The words "Vinylite", "Paraplex", "Shellsol", and "Sextone" are Trade Marks).

The solvent was evaporated from the coating to produce a block of clear lacquer on the board and the free surface of the block was then overprinted with marking characters using an ink of the following composition:—

Beckurane (Part I)	: 150 parts
Beckurane (Part II)	: 4.5 parts
Tioxide RCR 3	: 77 parts
Yellow Pigment (Irgalite BAW)	: 19 parts
Benzyl Alcohol	: 60 parts

(The word "Irgalite" is a Trade Mark). The characters were printed in reverse using a silk screen printing technique employing a screen mesh size 200 mesh per inch. The printed characters were dried, care being taken to ensure that the temperature did not exceed 80°C. so as to avoid initiating the curing reaction.

The resultant transfer was then located on a cotton fabric so that the characters were in contact with the fabric and the board was uppermost. The label was then sealed onto the fabric using a pneumatically operated press at the following settings:—

Top Platen	: 200°C.
Bottom Platen	: 200°C.
Pressure	: 80 psi
Dwell Time	: 5 seconds.

Thereafter, the board was peeled off to leave the characters and the block of lacquer firmly sealed to the cotton fabric. The block of lacquer enhances the gloss of the marking characters and facilitates the removal of the particular board used as temporary support in this Example. Generally, however, it is not necessary to include such a block of lacquer for release purposes.

The resultant marking on the cotton fabric was found to exhibit excellent resistance to repeated domestic washing at temperatures up to boil and to commercial laundering and dry cleaning.

EXAMPLE 3

The procedure followed in Example 2 was repeated but in this case the coating applied to the board was not a continuous coating but was printed onto the board in the form of marking characters identical to those subsequently applied using the ink. This was effected such that the marking characters consisting of the clear lacquer were in registry with the marking characters consisting of ink.

The marked cotton fabric contained was similarly resistant to repeated washing and commercial laundering and dry cleaning.

EXAMPLE 4

The procedure set out in Example 2 was repeated except that, after the marking characters had been applied, a coating of black ink was applied by a silk screen printing method again using a 200 mesh screen. The composition of the black ink

was essentially similar to that of the yellow ink except that a black pigment was included. Thus, the black ink included a heat curable polyurethane composition in the vehicle liquid. As before, when drying the coating of black ink, care was taken to ensure that the temperature did not exceed 80°C. The coating of black ink formed a black background to the marking characters which was slightly smaller than the initial block of clear lacquer.

The markings on the fabric were found to exhibit excellent resistance to repeated domestic washing at temperatures up to the boil and to commercial laundering and dry cleaning.

WHAT WE CLAIM IS:—

1. A marking element suitable for marking a textile article, which element comprises a support and marking characters and has at least one face which includes a heat curable polyurethane composition comprising (a) a liquid urethane prepolymer of which the free isocyanate groups are substantially blocked and (b) an elastomeric polyamine-extended polyurethane.

2. A marking element as claimed in Claim 1, wherein the prepolymer is the reaction product obtainable by reacting an oxime with an isocyanate-terminated polyurethane derived from a hydrocarbon diisocyanate and an aliphatic polyol and wherein the polyamine-extended polyurethane is the reaction product obtainable by reacting a polyamine with an isocyanate-terminated polyurethane derived from a hydrocarbon diisocyanate and an aliphatic polyol.

3. A marking element as claimed in Claim 1 or 2 and in the form of a label, wherein the support is a permanent support, one face of the support carries the marking characters, and the other face of the support includes the polyurethane composition.

4. A marking element as claimed in Claim 3, wherein the marking characters are printed on the support with an ink comprising the heat curable polyurethane composition.

5. A marking element as claimed in Claim 3 or 4, wherein the marking characters are overcoated with a transparent layer.

6. A marking element as claimed in Claim 5, wherein the layer is in the form of a continuous coating.

7. A marking element as claimed in Claim 5, wherein the layer is discontinuous in that it is substantially merely in registry with the marking characters.

8. A marking element as claimed in Claim 5, 6 or 7, wherein the layer is formed of the heat curable polyurethane composition.

9. A marking element as claimed in Claim 1 or 2 and in the form of a transfer, wherein the support is a temporary support and the marking characters are printed on to one face of the support with an ink comprising the heat curable polyurethane composition.

10. A marking element as claimed in Claim 1 or 2 and in the form of a transfer wherein the support is a temporary support, one face of the support is coated with a transparent layer, and the marking characters are printed onto the free face of the transparent layer with an ink comprising the heat curable polyurethane composition.

11. A marking element as claimed in Claim 1 or 2 and in the form of a transfer wherein the support is a temporary support, one face of the support is coated with a transparent layer of the heat curable polyurethane composition, and the marking characters are printed on to the free face of the transparent layer.

12. A marking element as claimed in Claim 11, wherein the marking characters are printed with an ink comprising the heat curable polyurethane composition.

13. A marking element as claimed in Claim 10, 11 or 12 wherein the transparent layer is in the form of a continuous coating.

14. A marking element as claimed in Claim 10, 11 or 12 wherein the transparent layer is discontinuous in that it is substantially merely in registry with the marking characters.

15. A marking element substantially as hereinbefore described in any one of the foregoing Examples.

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